

Inclusive Jet Cross Section Using 5.3.1

- Use the MC to determine a bin-by-bin correction to the Inclusive Jet E_T distribution.
- Compare bin-by-bin results to the Run I unfolding
- Reweight the MC so that the E_T distribution is in better agreement → *improve result from the bin-by-bin method.*
- Use the MC to derive the response function and use an iterative unfolding method.
- Once the technique is verified, determine the cross section measurements for other jet algorithms (MidPoint, KtClus).
- Extend measurements to the forward η region

Vertex Problems in 5.1.0

Problem with vertexing in the “c” dataset (offline 5.1.0).

If you redo jet clustering for some filesets the jet E_T is calculated using $z=0$.

Did not look too closely but had the impression that the problem was not Dependant on the run but happened for later filesets.

Concerned that the dataset is not being treated uniformly...

Ran over the gjt10d, gjt20d, gjt30d, gjt40d datasets that were processed using offline version 5.3.1.

Used DataAccess runMaker compiled with 5.3.1 to produce the ntuples. Redid clustering but did not redo calorimetry.

```
mod talk CalibrationManager
```

```
    ProcessName set PROD_PHYSICS_CDF
```

```
    PassName set 11
```

```
exit
```

```
mod talk    JetCluModule-cone0.7PrimVertex
```

```
    vertexStrategy set 1
```

```
exit
```

```
path create QCDPATH-All ManagerSequence \
```

```
    MidPointModule-PrimVertex \
```

```
    JetCluModule-cone0.7PrimVertex \
```

```
    KtClusModule-PrimVertex
```

Used version 4 of the QCD goodrun list.

List for QCD no silicon no runs excluded (0,0,0,0)

Lumi = 208.76 pb

71 runs were removed because of event count mismatches, after removing these runs we have:

Lumi = 191.53 pb

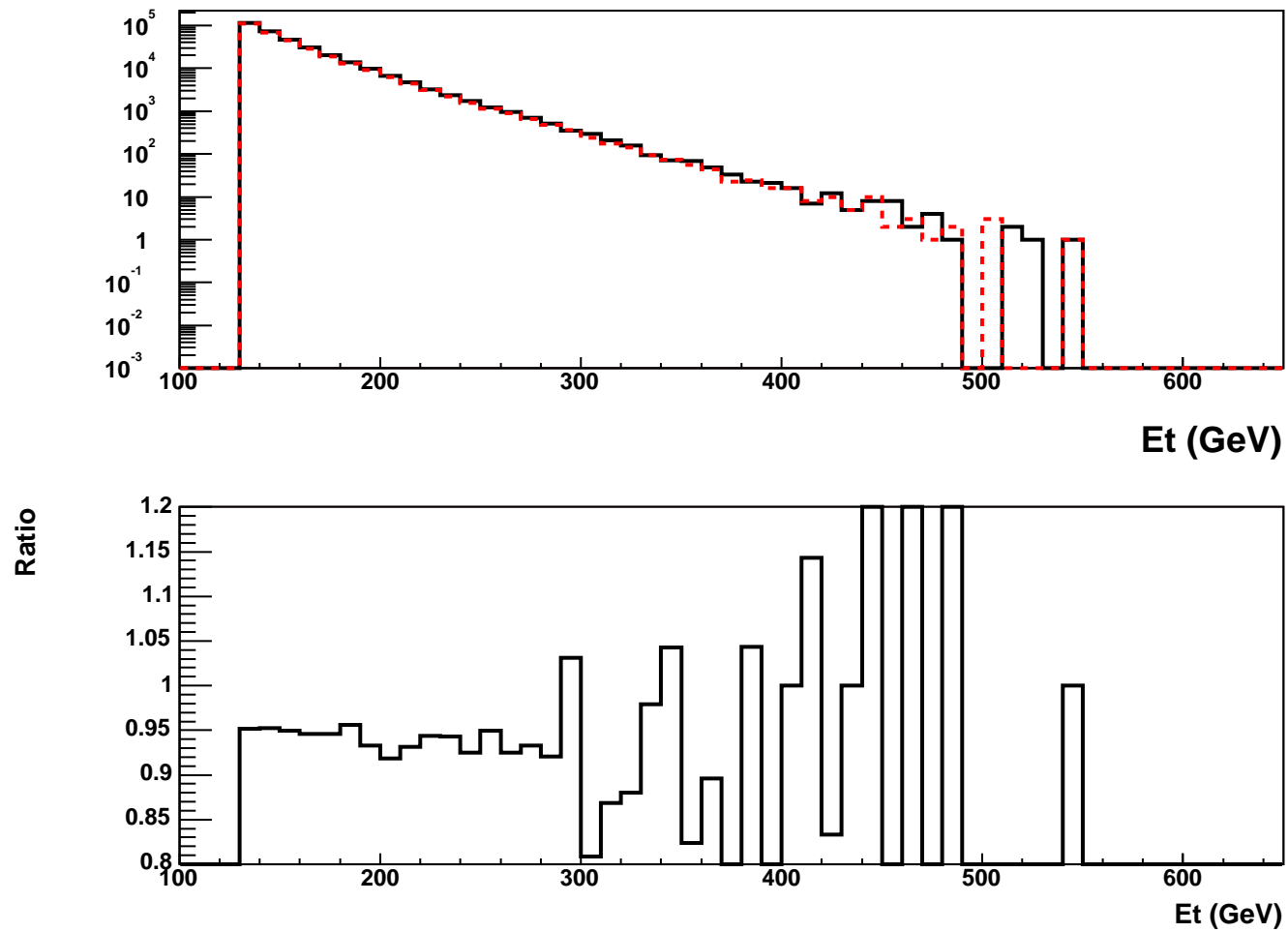
Could just scale the luminosity for the runs with missing events...

ntuples located at:

`fluorine:/cdf/disk01/g3/jets_5.3.1`

Can be moved to a public place on request...

Vertex problem has a measurable effect on the E_T distribution.



E_T distribution from J100 sample processed with 5.1.0 and 5.3.1.

Events with $z=0$ in 5.3.1

J20 $V_z = 0$: 82 / 972316

J50 $V_z = 0$: 18 / 316541

J70 $V_z = 0$: 16 / 172711

J100 $V_z = 0$: 76 / 287792

Jet5 or Jet10 dataset not processed with 5.3.1 (needed to go to lower E_T)

Waiting for Calorimeter calibrations before processing of the newer data

Prescales changed part way through the run.

→ Need to use the data to determine the prescales for the different jet thresholds.

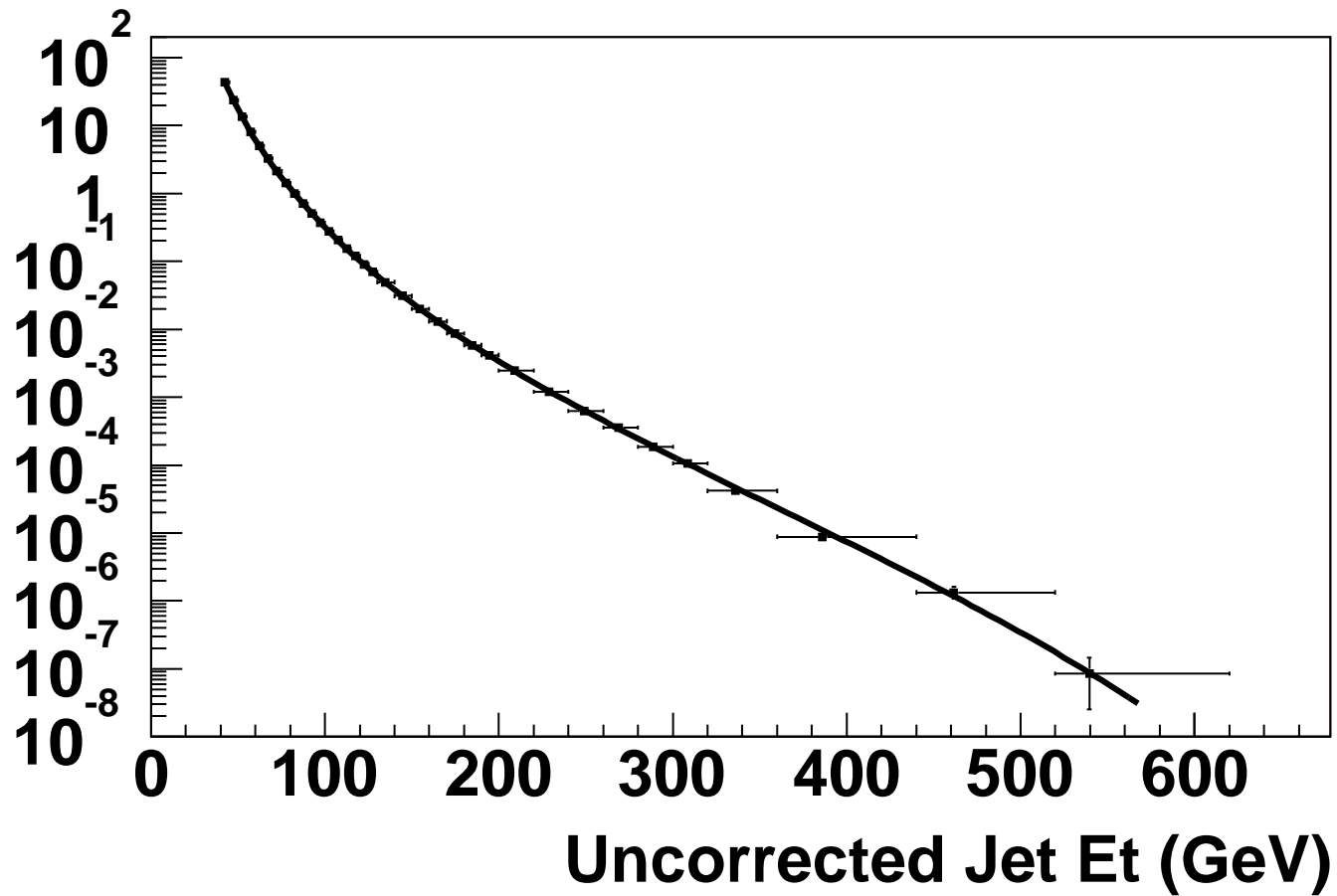
ST5 Fired/Accepted = $3.59124 \times 10^6 / 180062$ 19.9445

C20 Fired/Accepted = $3.83157 \times 10^6 / 184645$ 20.751

C70 Fired/Accepted = $3.12912 \times 10^6 / 391105$ 8.0007

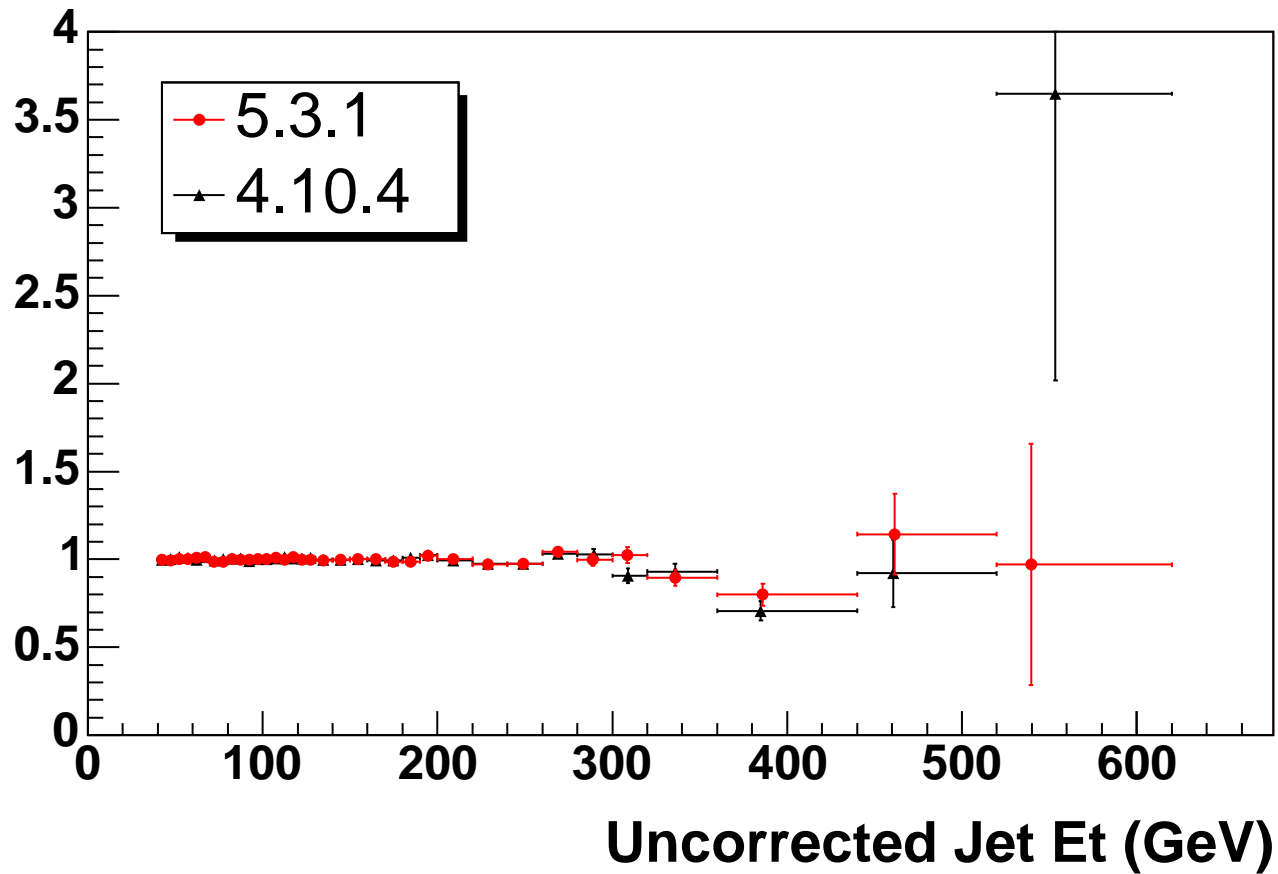
Store trigger information (trigger “fired”, event accepted).

Check that the J20, J50, J70 and J100 samples are being “joined” correctly.



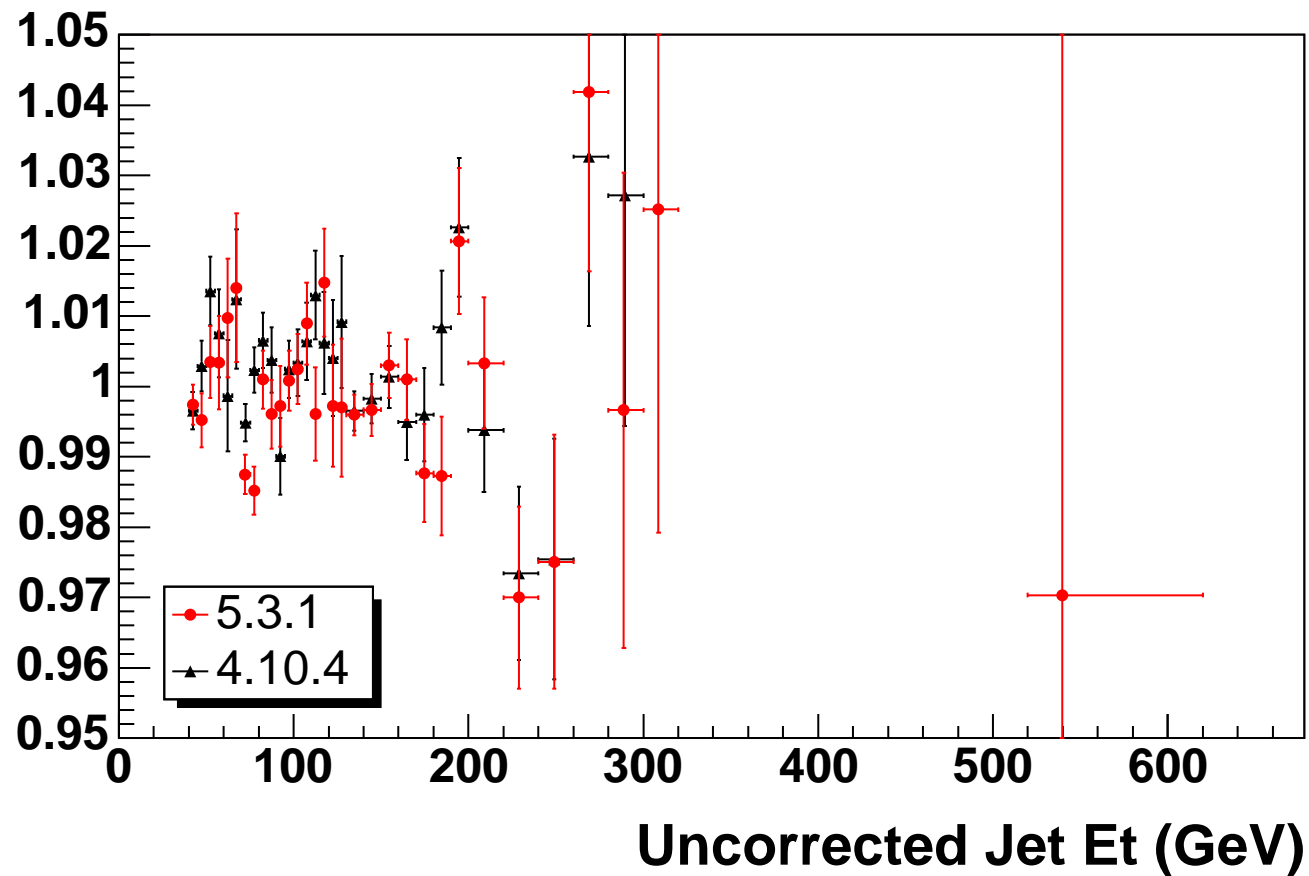
Fit the Raw data to a smooth curve.

Plot of (Data - Fit)/Fit



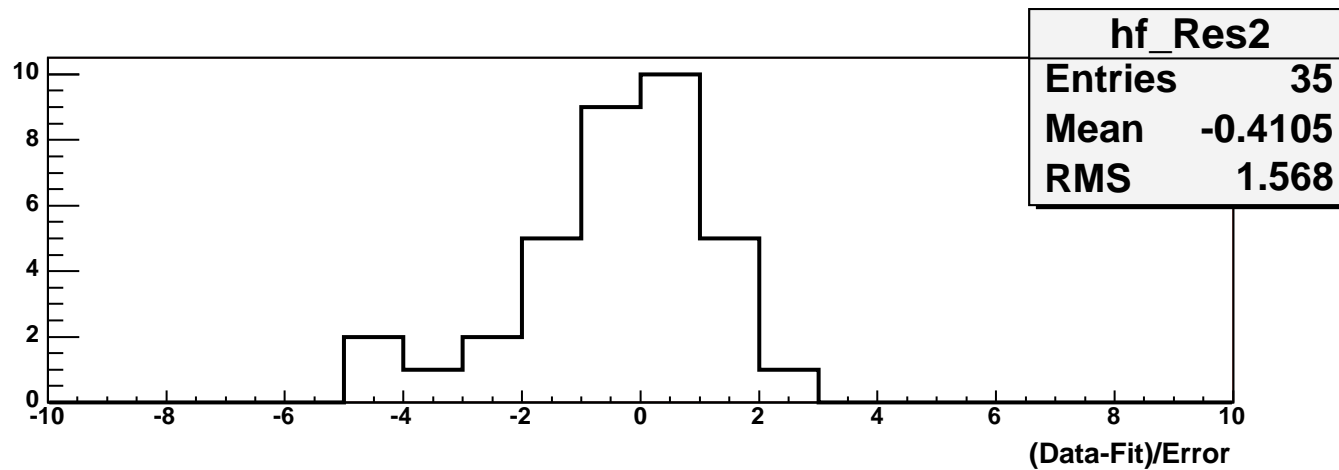
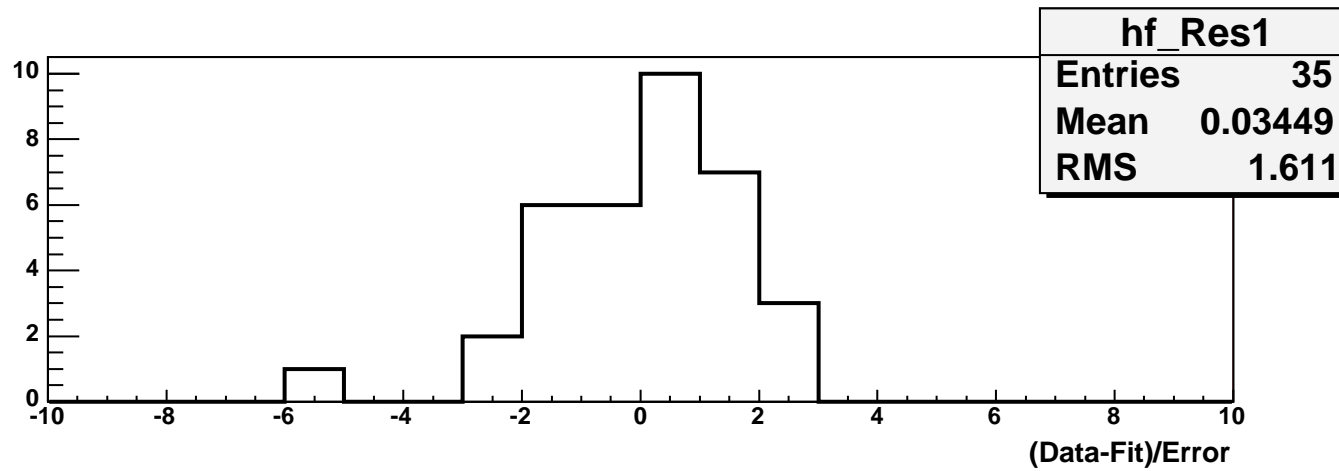
Good agreement between data processed with 4.10.4 and 5.3.1

Don't see any big steps which would indicate a problem with the prescale determination.

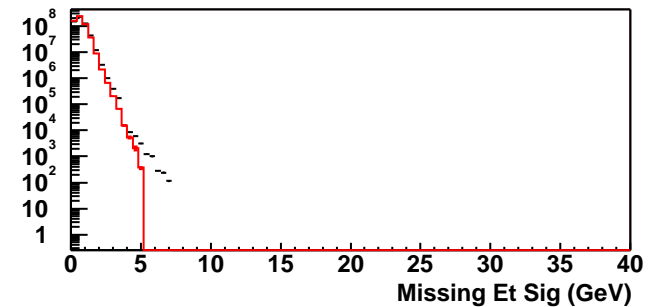
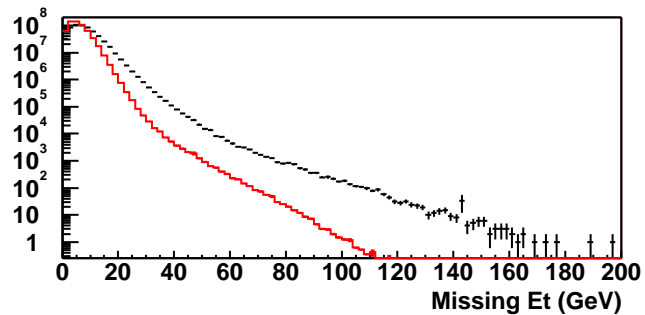
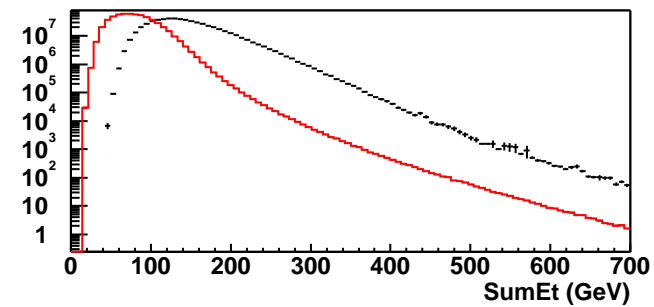
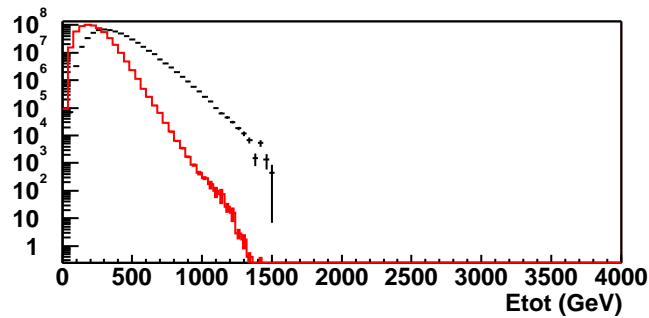
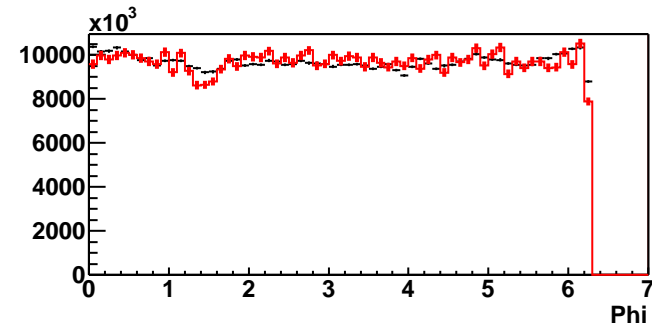
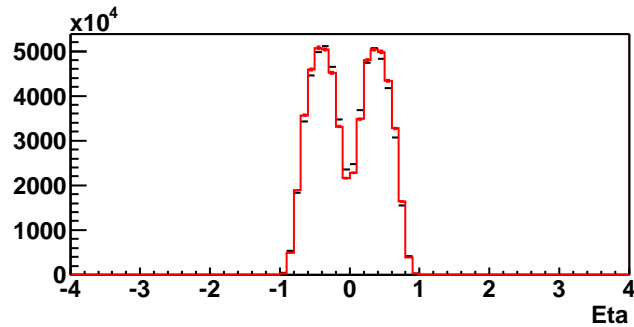


Plot of (Data - Fit)/Fit

Residuals



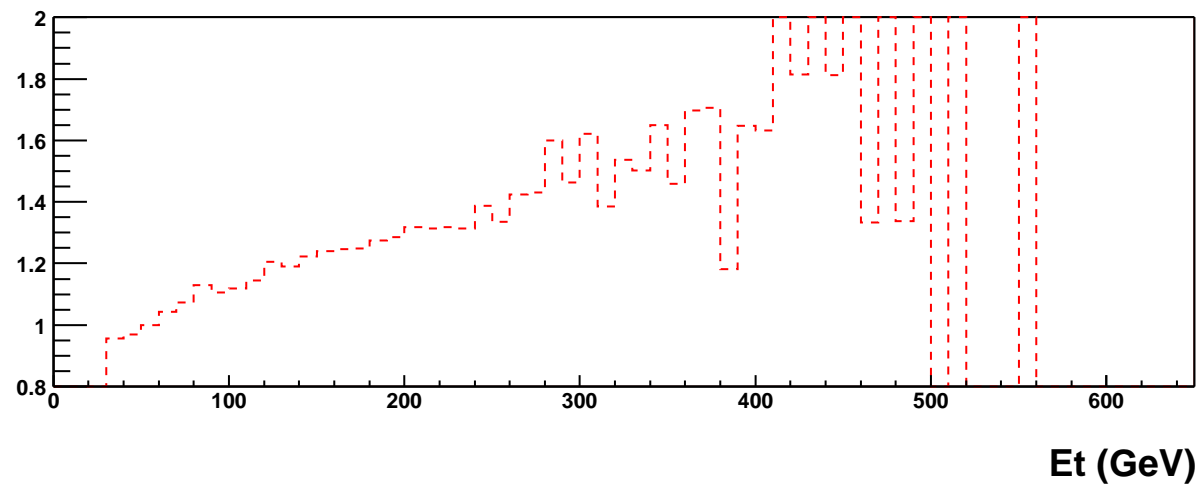
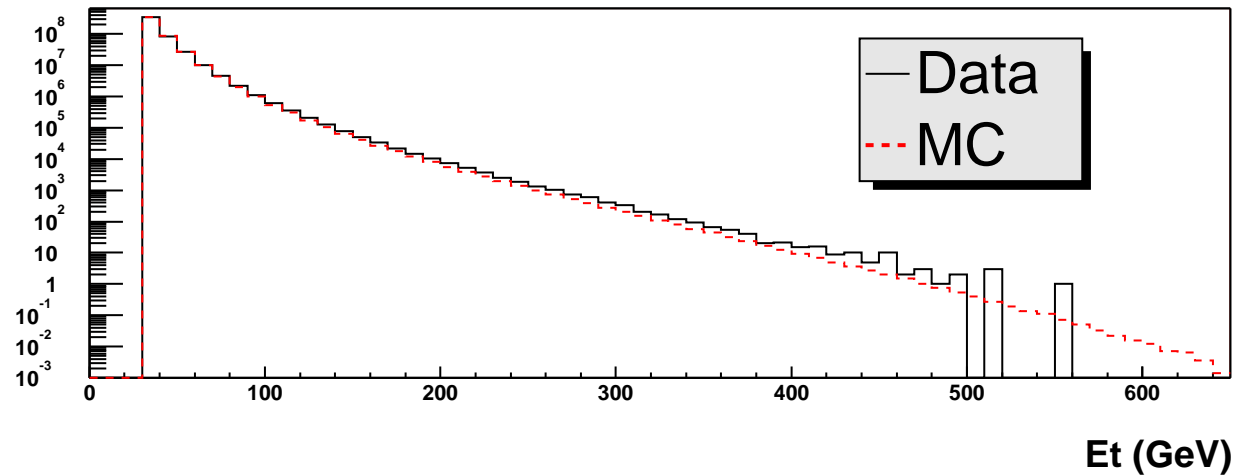
MC/Data comparison of some global quantities



→ See large discrepancies in global distributions....

Data has more energy, check Cal Tower threshold...

Measured Data Compared with “Measured” MC

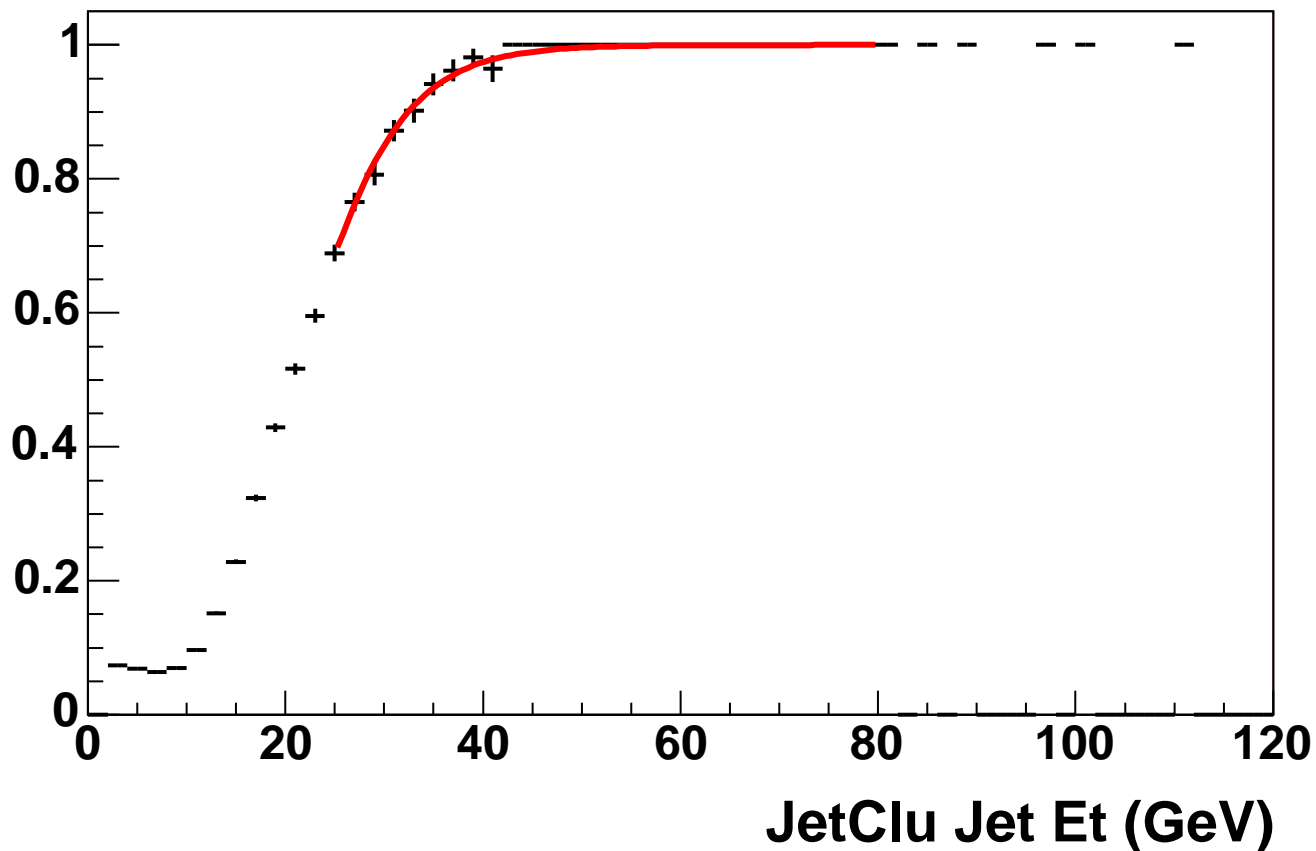


→ *Data rising with increasing E_T*

Can *reweight* the MC to get better agreement.

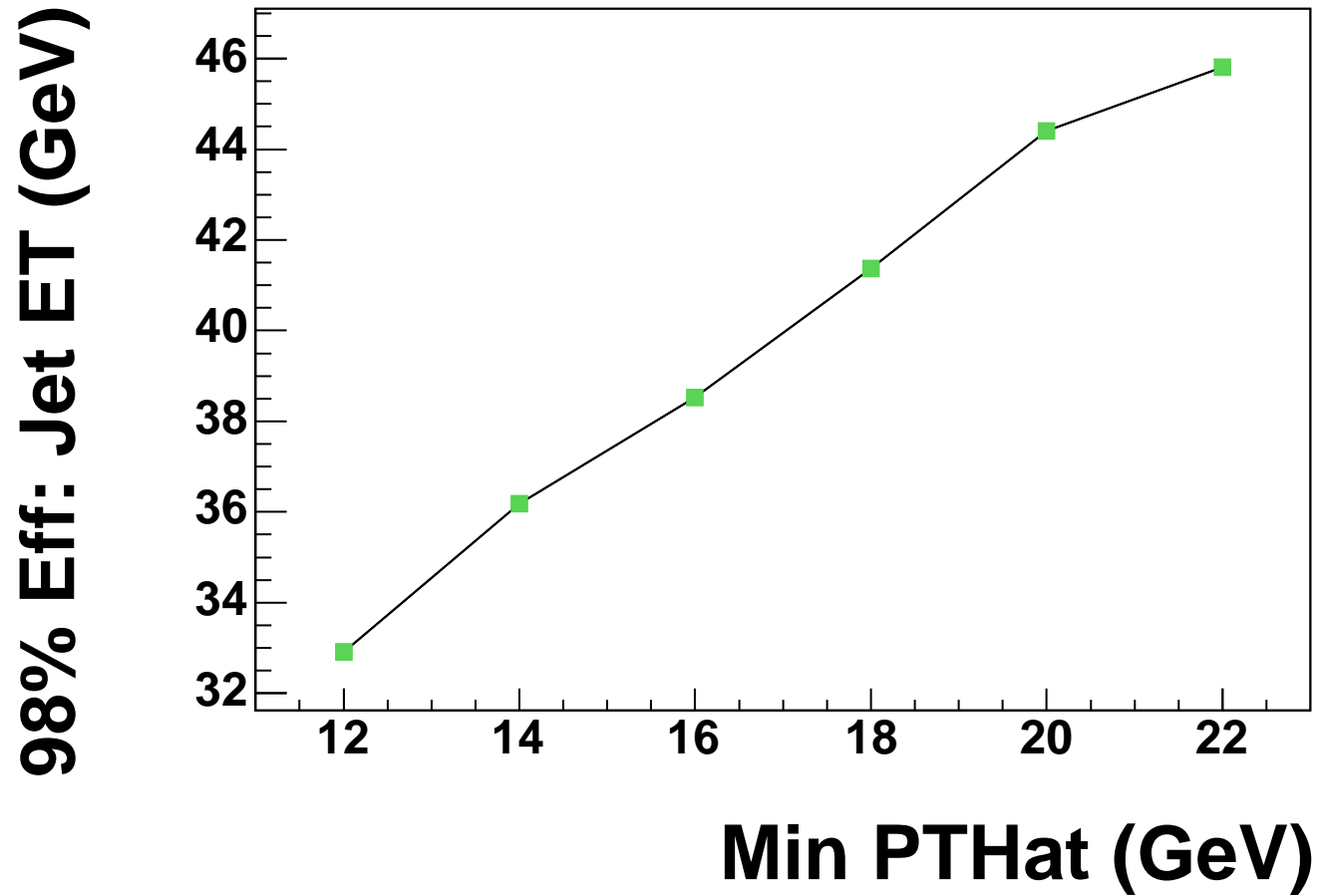
How low in PtHat do we have to generate events?

Used the PTHat 10 sample and looked at the inclusive jet ET distribution for different PTHat cuts.



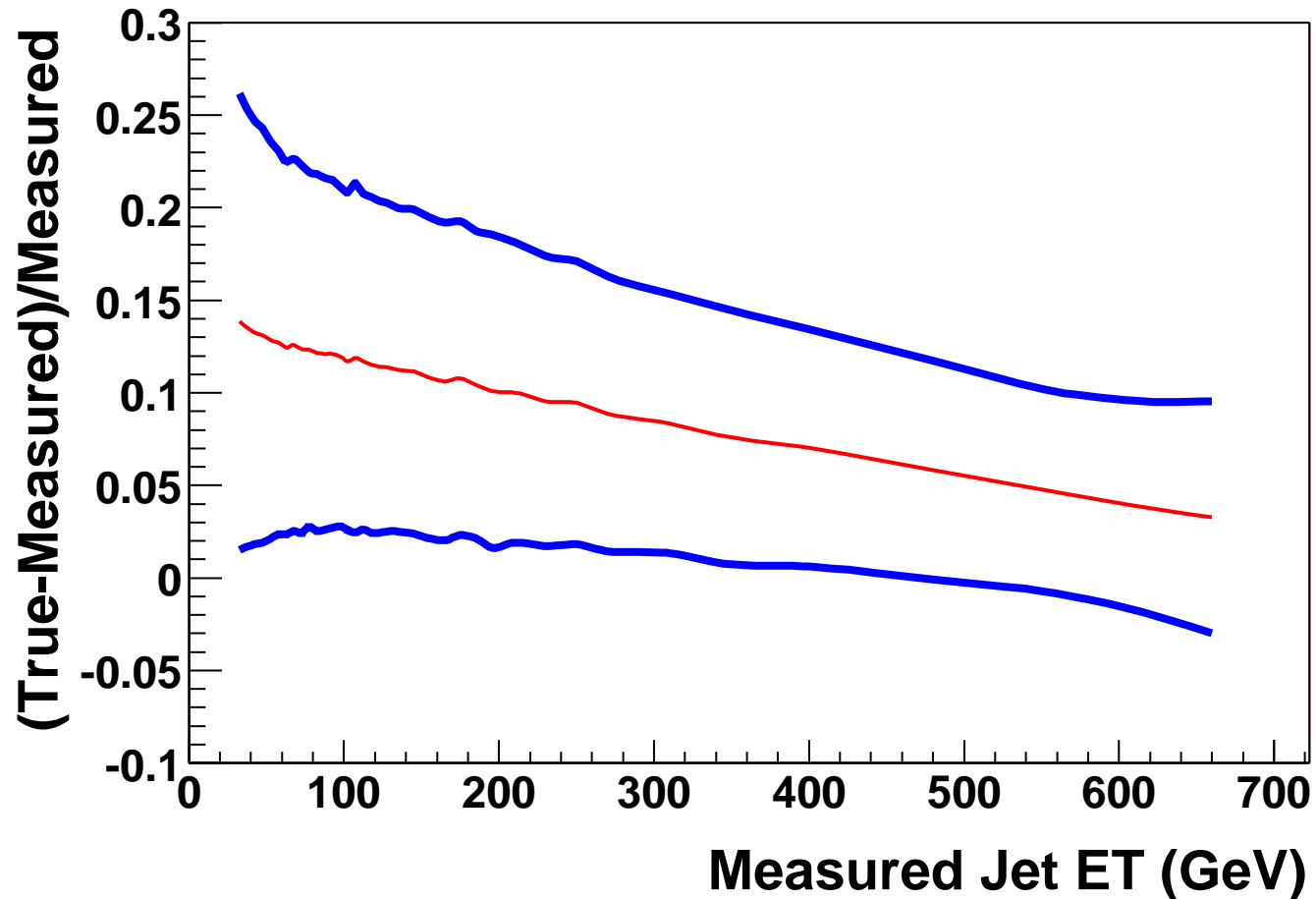
PTHat = 18

Plotted the Inclusive jet ET for 98% efficiency.



Require $E_T > 45$ GeV

Jet Resolutions Determine From the MC



Jet resolution varies from 12% at low E_T to 6% at high E_T .

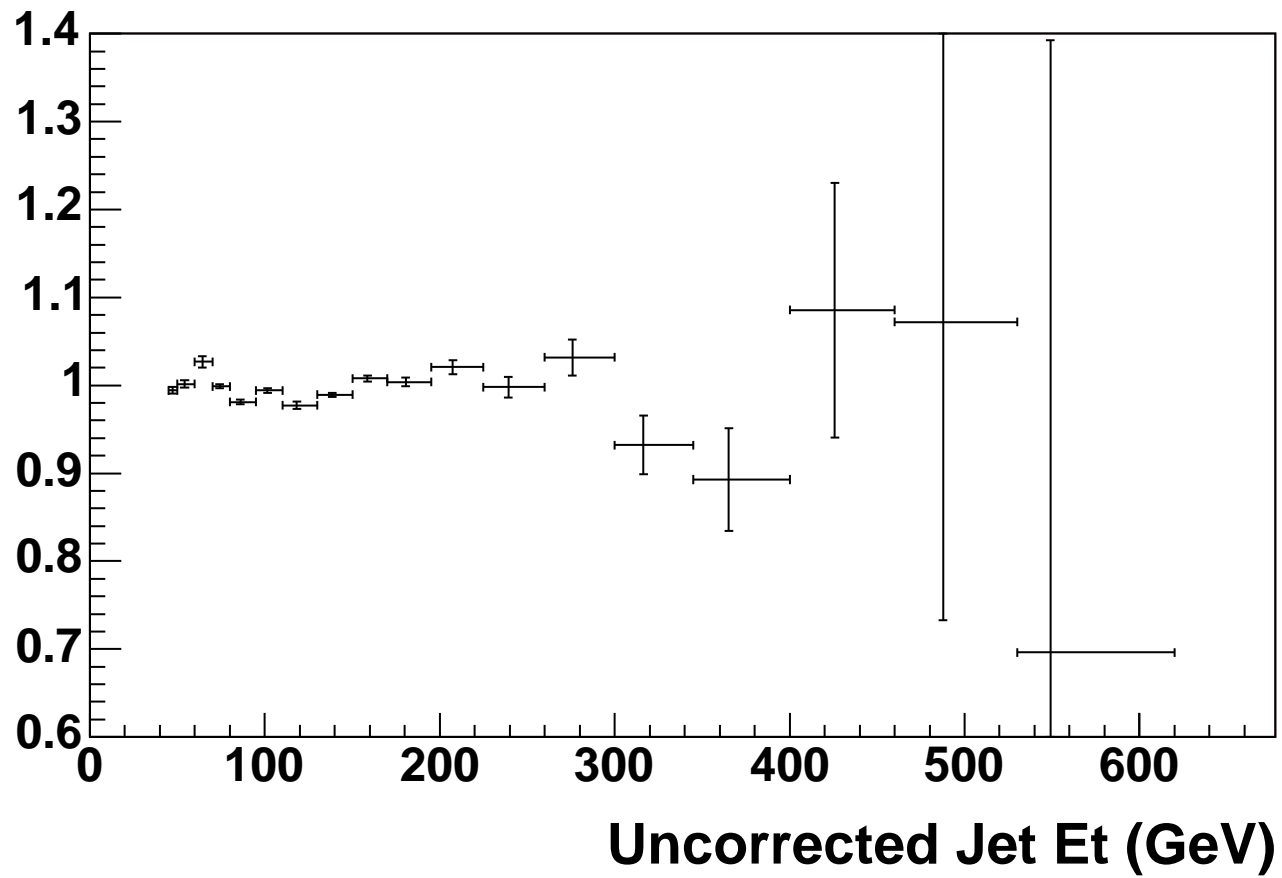
The measured Jet E_T is shifted by 14% at low E_T to about 3% at high E_T .

Increased bin widths to about 15%

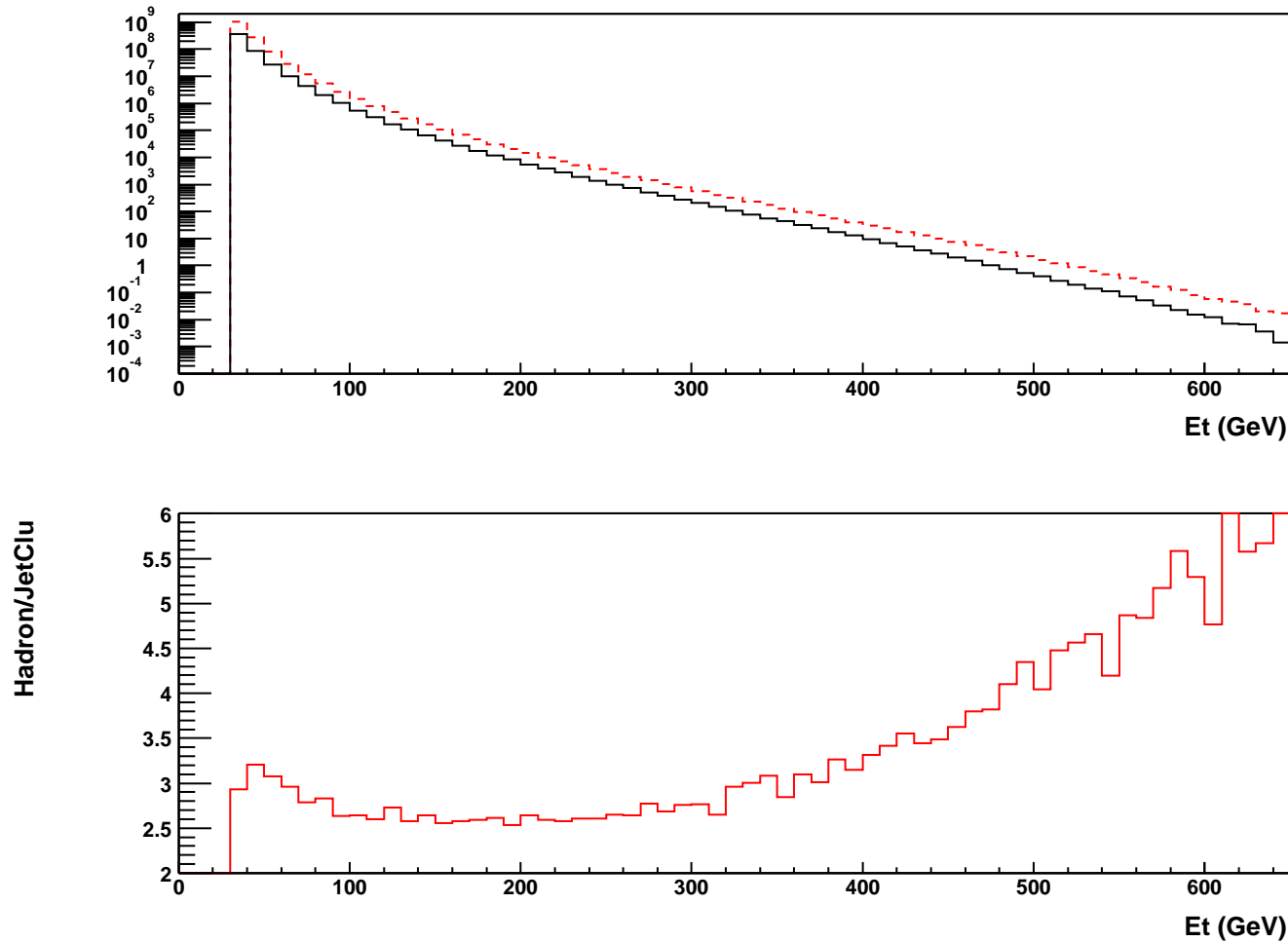
E_T	width	% Res	E_T	width	% Res
45	5	11.1	170	25	14.7
50	10	20.0	195	30	15.4
60	10	16.7	225	35	15.6
70	10	14.3	260	40	15.4
80	15	18.7	300	45	15.0
95	15	15.8	345	55	15.9
110	20	18.1	400	60	15.0
130	20	15.4	460	70	15.2
150	20	13.3	530	90	17.0

In Run I we used bins widths ranging from 4 - 22%.

Plot of (Raw Data - Fit)/Fit

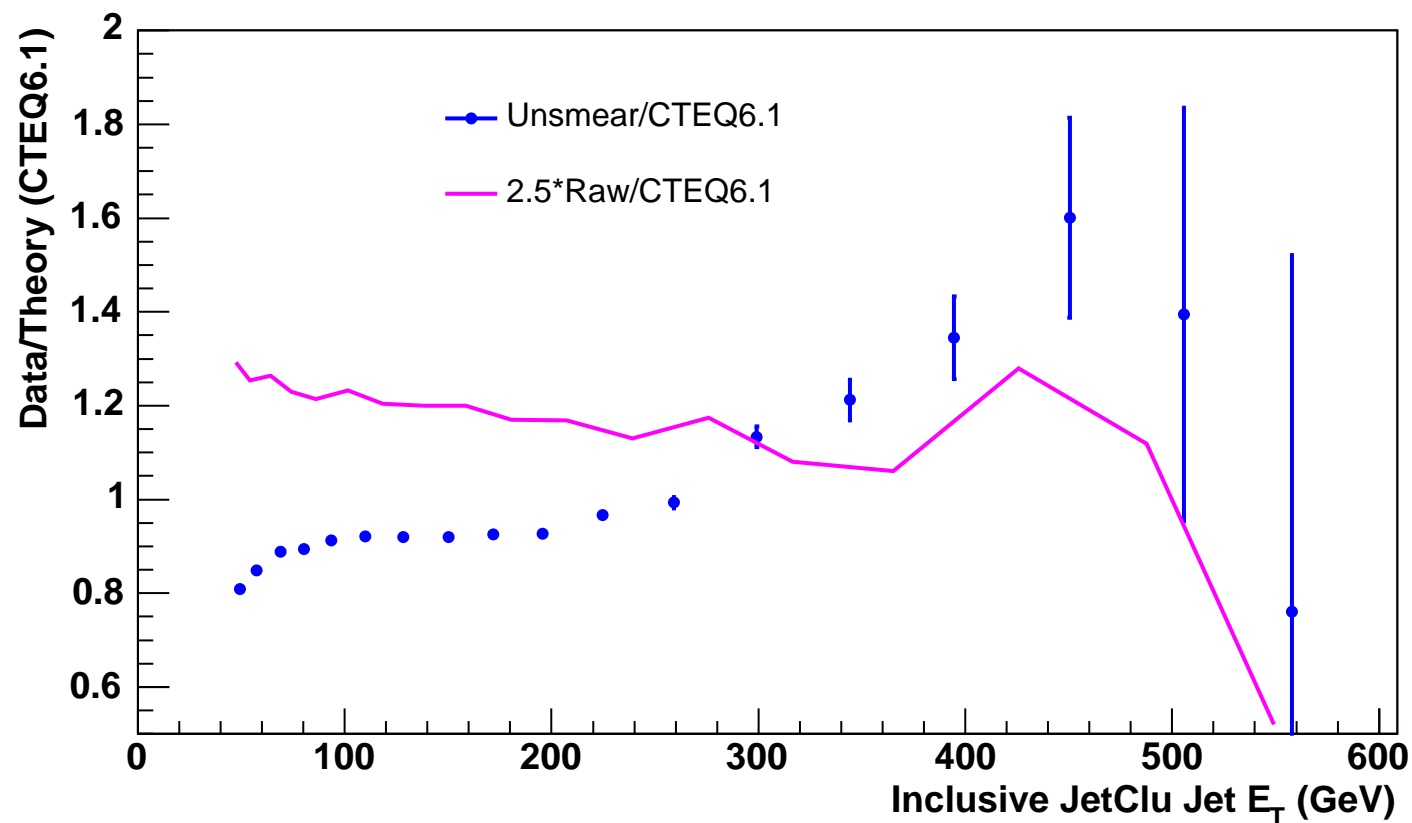


Comparison of Inclusive JetClu E_T distribution with Inclusive Hardron level JetClu.



Turn over at low E_T is due to the $PT=18$ threshold...

Comparison of Run I unfolding to Raw E_T distribution



Raw E_T was scaled by 2.5

Conclusions

The data reconstructed with 5.1.0 (gjtXXc) had some problem with the event vertex. *Avoid this dataset*

→ should understand the source of the problem...

The data reconstructed with 5.3.1 (gjtXXd) looks better and raw distributions compare well with 4.10.4.

Only the data from runs 138815 - 168889 have been reprocessed.
Waiting for calorimeter calibrations before newer data can be reprocessed...

→ should understand why there is a event count mismatch in the ntuples and with the database...

MC/Data comparisons have big discrepancies on some of the global quantities

→ Need to check calorimeter cell thresholds...

Does the current simulation describe the data well enough to be used to correct the measured Jet E_T distribution?

Currently using version 4.9.1.